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Enhancing Security and Privacy Issue in Airport by Biometric based Iris Recognition System using Matlab

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***Abstract*— Few years ago a self service has been predominant way of passenger at airport. For the passenger that is a very enjoyable and comfort situation because it keeps control over all process during their complete journey. For airport and for airlines is also very interesting evolution because self service allows increasing capacity of airport without any significant extra investment. However success of self service induces one potential risk. That is of lack of human contact between airline operator and passenger, there is a problem in identifying a passenger. This is definitely the problem for immigrations forcibly. This potential risk of the industry is needed to be addressed and biometrics definitely can solve this kind of problem. Nowadays biometric is considered to be the most important and reliable method for personal identification. Iris recognition is considered as most personal identification.**

***Index Terms*— Iris recognition methods, Template matching, Best Match search method, Manhattan distance**

I. Literature Review

A. Introduction

Iris is a complex pattern which consists of many distinctive features. Each iris is unique and even twins have different iris. Furthermore, iris is more easily imaged than retina; it is very difficult task to tamper iris texture information and it is also possible to detect artificial iris. Although early iris based identification systems required considerable user participation and were expensive, efforts are underway to build more user-friendly and cost-effective versions. To obtain a good image of iris, identification systems, typically illuminate iris with near-infrared light, which can be observed by most cameras and is not detectable by humans. The results are more accurate for iris-based identification. Due to this advantage and it is common to consider iris is one of the best biometric traits. the above described characteristics, it is common to consider iris as one of the best biometric traits.

Properties of an iris as an identifier

- Highly protected Internal organ of the eye.
- Externally visible from distance up to some meters.
- Random pattern of great complexity and uniqueness..
- Pattern is not genetically defined

B. Template matching[2]

The match metrics use a difference equation with general form:

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$D_n(x,y) = (\sum_{i=1}^{p} | xi - yi | p)^{1/p}$
l_n^p denotes the metric space (R^n,d_p) for R^n n>1
Where R^n denotes the n number of Region
d_p denotes the difference of the match metrics.
P denotes the pixel of images.
Sums of absolute difference (SAD) [1] : This metrics sum the absolute value of the difference between pixels in the originals image and the corresponding pixels in the template image. The metric is the ll norm of the difference image. The lowest SAD stores estimates the best position of template within the search image
The general SAD distance metric becomes:
$d_1(I_j,T) = \sum_{i=1}^{n} | Ii,j - Ti |$
Where T denotes pixels in the Template image.
I_1 denotes the pixel in the original image.

C. Best Match Search Method

Best Match Search Method [2] :This method to find the best match location for the output parameter. This option appears when we select Best match location for the output parameter .Select search method i.e Exhaustive output N X N matrics of metrics values around best match. This option appears when selected now Best match location for the output parameter. Select the checkbox (which is a particular pixel is selected) to output a metrics values centered around the best match. While doing this block adds the Nmetric(Numeric metric) and Nvalid (Neighborhood metric). The region of interest(ROI) appears when Best match location for the output parameter is selected. The check box for the template matching block is selected for the region of interest processing . When this is done the block adds the Region of Interest (ROI) input port to the template matching block. The ROI processing option is only available for the best match index mode. The output of the metric port for the match metric mode is of the valid image size . The ROI port requires a four element vector that defines a rectangular area must have the format [x, y, width, height]. The first two element represent [x,y] co-ordinates for the upper left corner of the region . The second two elements represents the width and height of the region. The search starts with a step size equal to or slightly greater than half of the maximum search range and then employs the following steps:

- The block compares search points in each method. There is a central point and other search points located on the search area boundary.
- The block decrements the step sign of one pixel.
- At each new steps, the block moves the search center to the best matching point resulting from the previous step.

D. Manhattan Distance metric[3]

Manhattan distance metric[3] is the difference between pixels in the original image and the corresponding pixels in the template image. The metric is the l^1 norm of the difference image. The lowest Manhattan distance store estimates the best position of template within the search image. The general Manhattan distance metric becomes:
$d_1(I_j,T) = \sum_{i=1}^{n} | Ii,j - Ti |$
Where T denotes the pixels in the template image
I_j denotes the pixel in the original image

II. RELATED WORK

A. Introduction

In this paper we have developed an algorithm to identify person in airport to stop terrorist activities , Bomb blast and others. When the passenger will enter the airport of the camera will capture the if eye is considered. Passenger with the top of that there is simplicity. The entire passenger just needs to do that Just steps into that place where camera is placed. Look at the camera and we are actually reverting the traditional process where the person had to stand in front of camera take instruction like move back a little , move forward please look at the camera and please try again. Now it is very simple you just walk in stop you look and look and walk out. The third element is speed, the identifying a person in airport this system take nearly only 2 seconds that speed of human verification.

B. Iris Recognition Methods

The iris is an visible protected organ which provides uniqueness pattern throughout the life. It is very attractive biometrics system for identifying individuals specially in the case of twins. In the Iris recognition system , their eye is first captured and then a template is created for their iris area. This template when compared with the other template stored in the database until a matching is found and the person is identified or no match is found then the person is not identified. It is the most protected biometric technology compared with other biometric technologies such as face and finger recognition. In this method, captured image first converted into segmented image and segmented image is then converted into normalized image and finally normalized image is then converted into Binary signatures. Algorithm for the Iris recognition system is mentioned below in Fig.1

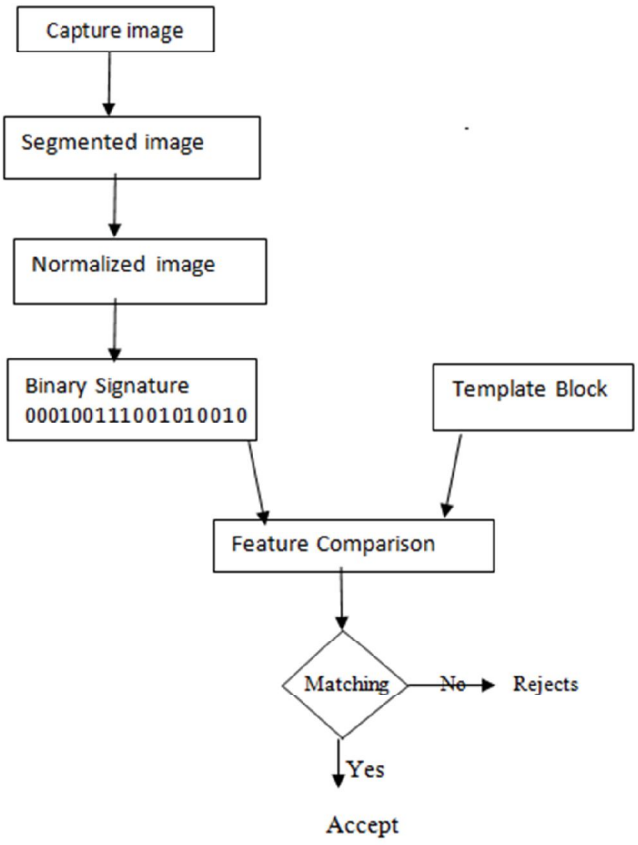

Fig.1. A major Stages of Iris recognition method

Fig.2. Segmented Image

Fig.3. Normalized Image

Fig 4. Binary Image

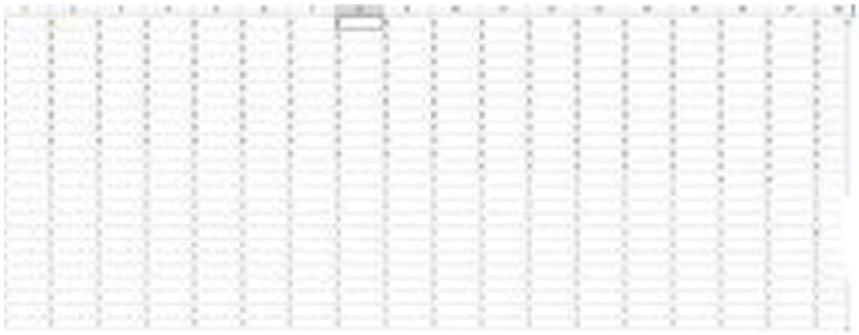

Fig . 5. Binary Signature in 2D Matrix

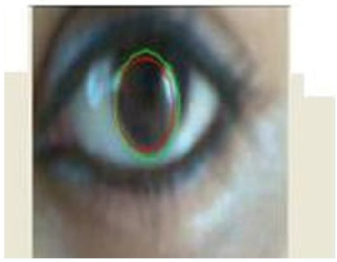

Fig 6 : Identification of person from the template block using Iris recognition method

Explanation of Fig :

In Fig.2 we load the original image. We can perform arithmetic operations on integer data, which enables you to convert image types without first converting the numeric class of the image data. To display the image, use a grayscale color map with 256 values. Fig.3 is the normalized image which represents the iris using a fixed parameter interval . In a binary image, each pixel assumes one of only two discrete values: 1 or 0. A binary image is stored as a logical array. By convention, this documentation uses the variable name BW to refer to binary images. The Fig.4 shows a binary image with a close-up view of some of the pixel values. Binary images contain only 0's and 1's. Pixels with the value 0 are displayed as black; pixels with the value 1

are displayed as white. Fig.5 is the Binary signature of the 2D matrix which is equivalent to Binary image. Fig.6 identify the person enrolled in the template block.

C. Algorithms : Iris recognition algorithms [4]

Step 1 : Capture the Image
Step 2 : Display the capture Image
Step 3 : Calculate the monochrome luminance by combining the RGB values according to the a NTSC standard which applies co – efficient related to the eye`s sensitivity to RGB color
Step 4 : Convert Image to Binary Image based on threshold. The output image(level) replaces all pixels in the input image with luminance greater than with the value 1 (white) and replaces all other pixels with the value 0 (Black).
Step 5 : Global Image threshold using Otsu`s method Level = graythresh(I) computes a global threshold(level) that can be used to convert an intensity image to a binary image with im2bw . Level is a normalized intensity value that lies in the range [0,1].The graythresh function uses otsu's method , which choose s the threshold to minimize the intraclass variance of the black and white pixels
Step 6 : Stored the converted Binary no of the captured Image into N x N matrix and compared with the image stored in the database.

D. Program code[5]

```
rgb_img = imread('C:\Users\DC\Desktop\images.jpg');
image(r)
axis  image ;
I=  0.2989 *rgb_img(:,:,1) …
+ 0.5870 * rgb_img(:,:,2) …
+ 0.1140 * rgb_img(:,:,3);
I=  imread('C:\Users\DC\Desktop\images.jpg');
level = graythresh(I);
BW = im2bw(I, level);
imshow(BW)
```

III. RESULT [6]

Here is the example of how to calculate the manhattan distance between two iris codes**.** It sum the absolute value of the difference between pixels in the original image and the corresponding pixels in the template image. The metric is the l^1 norm of the difference image. The lowest SAD store estimates the best position of template within the search image. To simulate the effect of uncertainty. the threshold is fixed to 0.141

Iris1: 1 1 0 0 0 1 0 1 0 1 1 0 0 0 1 1 1 0 0
Iris2: 1 0 0 0 1 0 1 1 0 0 0 1 1 0 1 0 1 0 1
Manhattan distance of above two iris code Iris 1 and Iris 2 is
MD : 0.1235
Iris3: 1 0 0 1 0 0 1 1 0 1 1 0 1 1 0 0 0 1
Iris 4: 1 1 1 0 1 1 0 0 1 0 0 1 0 0 0 1 0 0
Manhattan distance of above two iris code Iris 3 and Iris 4 is
MD : 0.235

Identification: It is 1:M comparison of the captured image against a biometric database in attempt to identify an unknown individual. The identification only succeeds in identifying the individual if the comparison of the iris sample with a template in the database falls within a previously set threshold. As verification mode, in identification decision context there are two possible outcomes normally called like verification :-

False Acceptance Rate: Occurs when the system says that an unknown sample matches a particular person in the Template and the match is not correct.□The rate at which a matching algorithm incorrectly determines that an impostor's iris sample matches an enrolled sample.The proportion of attempts whose MD is below a given threshold. From Iris1 and Iris 2 , the MD = 0.1235 which is less than a given threshold (0.141) as shown in below Table 1.

False Rejection Rate: Occurs when the system says that the sample does not match any of the entries in the Template, but the sample in fact does belong to someone in the gallery. The proportion of authentic attempts whose MD exceeds a given threshold. The rate at which a matching algorithm incorrectly fails to determine that a genuine sample matches an enrolled sample. From Iris 3 and Iris 4, the MD=0.235 which exceeds a given threshold(0.141) as shown in below Table I.

TABLE I. TOTAL SUCCESS RATE

MD Threshold	False Acceptance Rate	False Rejection Rate	Total Success rate
0.141	10%	0%	80%
0.141	0%	20%	70%

Considering there two iris values it is observed that is the first case the total success rate is 80% on in the second case it is 70%.

IV. CONCLUSION

In this paper we have developed an algorithm to identify person in airport to stop terrorist activities , Bomb blast and others. It's very simple passenger will walk into the catering space of the camera . Camera will detect the face will look at the eyes will focus into the eyes then can saw the pictures of your iris coveted to the court.This system has three key elements: Accurate, it really allows identifying to very high degree of security every individual passenger with the top of that there is simplicity. We have used Template matching ,Best match search method and manhattan distance for matching the individual identity.

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